

AMENDMENT TO THE DRAWINGS

The attached sheets of drawings include changes to Figs. 3, 5 and 6. These sheets, which include Figs. 3, 5 and 6, replace the original sheets including Figs. 3, 5 and 6. The only change to Fig. 3 is that the image of the oloid is now clear. Thus, no annotated sheet is supplied for Fig. 3. The changes to Fig. 5 include the addition of a line and reference number 6. The changes to Fig. 6 include the change of reference number 21 to 21' and the addition of a line and reference number 21". Annotated sheets for Figs. 5 and 6 are supplied.

Attachment: Replacement Sheets, 3 pages
Annotated Sheet Showing Changes, 2 page

REMARKS

Applicant would like to thank the Examiner for the careful consideration given the present application. The application has been carefully reviewed in light of the Office action, and amended as deemed appropriate to place the application into condition for allowance.

Specifically, by this amendment claims 1, 2, 5 and 6 have been amended and claims 4, 7 and 8 have been canceled. No new claims have been added to the application. Accordingly, claims 1-3, 5 and 6 are pending in the application. For ease of examination, a clean copy of the claims, as amended, is attached hereto as Appendix A. No new matter has been added.

In the prior Office Action, the Examiner objected to the drawing figures on grounds that Fig. 3 was illegible and Fig. 6 did not make reference to circular gears 21' and 21". During review of the specification and drawing figures, applicant noted that reference number 6 was inadvertently omitted from Fig. 5. By this amendment, replacement sheets have been submitted that include changes to Figs. 3, 5 and 6, which address all of the issues raised by the Examiner. Acceptance of the replacement drawing figures is respectfully requested.

Also in the prior Office Action, the Examiner objected to the disclosure due to several informalities. Applicant has submitted a substitute specification contemporaneously with this amendment that addresses and corrects the specific items noted by the Examiner. The substitute specification also corrects the title of the invention, as requested. Reconsideration of the objections to the disclosure is thus respectfully requested.

In the prior Office Action, the Examiner rejected claims 1-8 under 35 U.S.C.

§112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The Examiner noted that there was inadequate antecedent basis for "the legs" in claim 1, part (G). By this amendment, reference to "the legs" has been deleted from claim 1.

In addition, the Examiner noted that there was inadequate antecedent basis for "the oval gears" in claims 5 and 6, and requested clarification regarding whether the "mutually engaging gears" had any relationship to the gears recited in claim 1. By this amendment, claim 5 has been amended to clarify that the two oval gears (20'; 20") are mutually engaging and roll off one another at a constant axial separation in a positively locking manner. And, claim 6 has been amended to depend from claim 5 and to clarify that the distance between the axes of two mutually engaging oval gears (20'; 20") is composed of the sum of the large semi-axis (a) and the small semi-axis (b) of the two oval gears (20'; 20").

Finally, the Examiner rejected claims 7 and 8 on grounds that it was not clear whether "one oval gear" had any relationship to the gears recited in claim 1. By this amendment, applicant has canceled claims 7 and 8 from the application. However, applicant has incorporated the subject matter of claim 7 into claim 1, and has clarified that the two oval gears are the gears having the claimed ratio. In view of the foregoing, reconsideration of the claim rejections under 35 U.S.C. §112, second paragraph, is respectfully requested.

Also in the prior Office Action, the Examiner rejected claims 1-8 as being unpatentable over Saladin (U.S. Pat. 4,784,338) in view of Abt et al. (WO 99/05435). The Examiner contends that Saladin discloses the device substantially as claimed, but does not disclose that the device includes a gear unit comprising two oval gears.

The Examiner notes that Abt et al. discloses a gear drive for driving a mixer in a tumbling motion that includes oval gears, and contends that:

It would have been obvious and mere common sense to one having ordinary skill in the art, at the time applicant's invention was made, to have substituted the gear drive unit in Saladin with oval gear drive unit of WO '435 [Abt et al.] for the purposes of distributing the forces in the gear drive unit over more than one tumbling and rotary movement to thereby reduce the frictional forces in the joints of the links of the mixer and to increase efficiency of the mixer [...].

Applicant respectfully disagrees with the Examiner's contentions and, for the reasons set forth below, requests reconsideration of the rejection of claims 1-3, 5 and 6.

Saladin discloses a mixing or stirring device including an oloid-shaped body, two parallel shafts and two arcuate drive levers, wherein each arcuate drive lever is rotatably connected to one of the shafts so that it can rotate about a first axis of rotation relative to the shaft. The oloid-shaped body is rotatably linked to each of the two drive levers so that it can rotate about a second axis of rotation relative to each drive lever. Further, each arcuate drive lever defines a plane in which the respective second axis of rotation is situated. The two second axes of rotation are spaced apart by a distance A and the first and second axes of rotation at each drive lever are spaced apart by a distance B which is identical for both drive levers (see col. 4, lines 62-67). The distances A and B must be equal (see col. 4, lines 67-68).

Therefore, the subject-matter of claim 1, as amended, differs from Saladin by requiring the presence of a gear unit (2) comprising two oval gears (20'; 20") one of said two oval gears (20') being connected to the drive shaft (16) and the other of said two oval gears (20") being connected to the (rear end (7) of one of the two parallel shafts (3), that the oval gears (20'; 20") exhibit a large semi-axis (a) and a small

semi-axis (b), that a ratio of the small semi-axis (b) to the large semi-axis (a) is $1/\sqrt{2}$, and that only one of the two parallel shafts (3) is connected to the drive shaft (16) of said motorized drive element (1) by means of said gear unit (2) of oval gears (20'; 20").

Abt et al. discloses various embodiments of a gear unit including oval gears.

The variety of embodiments can be categorized as follows:

- embodiments allowing to convert the kinetic energy of a flow of gas, of liquid or of another viscous medium, into a torque applied to two shafts rotating in pulsed manner;
- embodiments where a torque applied to at least one rotating shaft may be converted also into a pulsed flow motion of a gas, of a liquid or another viscous medium;
- embodiments with a different number and a different arrangement of oval gears only according to Figs. 3, 4, 10 and 11;
- embodiments including a different number and a different arrangement of oval and circular gears according to Figs. 1, 2, 7 and 8; and
- embodiments of the oval gears with a ratio of the small semi-axis (b) to the large semi-axis (a) of $1/\sqrt{2}$ or of $1/2$.

The device according claim 1 as amended herein therefore is a selection of technical means from a considerable variety of possibilities, i.e. use of the device to generate a pulsed flow motion of a gas, of a liquid or other viscous medium, to connected the motorized drive element to one shaft only, to select a gear unit comprising two oval gears only and to select the ratio of the semi-axes of $1/\sqrt{2}$.

Furthermore, for the reason that in Abt et al. the advantage achieved by the invention is particularly related to the fact that the flux of the driving forces between the two parallel shafts does not take place via the connecting links carrying out a tumbling and rotating motion, but rather takes place via the oval gears of the gear

unit (see English language translation of Abt et al. page 4, last paragraph to page 5, first paragraph). This configuration is mentioned to allow for a significant reduction in the frictional forces in the joints between the connecting links resulting in a higher efficiency of the device. Therefore, this teaching would motivate a person having ordinary skill in the art in the completely opposite direction, because there would be no motivation to select a configuration of a gear unit as claimed in amended claim 1, where the flux of the driving forces between the two shafts takes place via the connecting links.

The device of Saladin is directed to the object of configuring a simple drive for a tumbling and rotating body. The disclosed arrangement of a gear rim and a gear wheel in such a manner that one shaft rotates at a constant distance from the second shaft around said second shaft would not allow to significantly reduce the rotational oscillations due to the heavy mass rotation around the second shaft. Therefore, the cited prior art does not include a disclosure of an actual hint that a device according to the amended claim 1 would allow the advantage of a significant reduction of the frictional resistance and of the rotational oscillations of the device by configuring the device:

- with only one motorizedly driven shaft so that a gear unit including two gears only can be used;
- with two oval gears having a ratio of the semi-axes of $1/\sqrt{2}$ in order to achieve a minimum deviation from circular gears to reduce the rotational oscillations and to further reduce the frictional resistance; and
- to configure the second arcuate drive lever and the second shaft as a travelling drive lever, respectively, a travelling shaft to eliminate any gears arranged between the two shafts and to prevent the connecting links from jamming due to the non-uniform motion which can occur if both shafts are motorizedly driven.

For the foregoing reasons, it is respectfully submitted that the subject matter claimed in the present application is not obvious in view of Saladin and Abt et al. Furthermore, in light of the foregoing, it is respectfully submitted that the present application is in a condition for allowance and notice to that effect is hereby requested. If it is determined that the application is not in a condition for allowance, the Examiner is invited to initiate a telephone interview with the undersigned attorney to expedite prosecution of the present application.

If there are any additional fees resulting from this communication, please charge same to our Deposit Account No. 18-0160, our Order No. LUS-16295.

Respectfully submitted,

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Appendix A
(clean copy of claims as amended)

Claim 1 (currently amended): A device for generating pulsed motions, comprising:

a motorized drive element (1) connected to a drive shaft (16);

two parallel shafts (3; 4), each of said parallel shafts having a longitudinal axis (5; 6), a rear end (7; 8), and a front end (9; 10);

a gear unit (2) comprising two oval gears (20'; 20'') one of said two oval gears (20') being connected to the drive shaft (16) and the other of said two oval gears (20'') being connected to the (rear end (7) of one of the two parallel shafts (3);

two arcuate drive levers (30; 31), each of said arcuate drive levers having a first end (32; 33) and at least one second end (34; 35), where each first end (32; 33) of the drive levers (30; 31) is connected in a rotatable manner with one respective front end (9; 10) of the two parallel shafts (3; 4) about a first axis of rotation (11; 12);
and

a polysomic drive body (40) connected to the second ends (34; 35) of the drive levers (30; 31) so as to be rotatable about two second axes of rotation (13; 14);
wherein

oval gears (20'; 20'') exhibit a large semi-axis (a) and a small semi-axis (b),

a ratio of the small semi-axis (b) to the large semi-axis (a) is $1/\sqrt{2}$, and

only one of the two parallel shafts (3) is connected to the drive shaft (16) of said motorized drive element (1) by means of said gear unit (2) of oval gears (20'; 20'').

Claim 2 (currently amended): The device as claimed in claim 1, wherein each arcuate drive lever (30; 31) subtends a plane (36; 37), the second axes of rotation (13; 14) are situated in the planes (36; 37) and the first axes of rotation (11; 12) are transverse to the planes (36; 37).

Claim 3 (previously presented): The device as claimed in claim 1, wherein the second axes of rotation (13; 14) are mutually skewed.

Claim 4 (canceled)

Claim 5 (currently amended): The device as claimed in claim 1, wherein the two oval gears (20'; 20") are mutually engaging and roll off one another at a constant axial separation in a positively locking manner.

Claim 6 (previously presented): The device as claimed in claim 5, wherein the distance between the axes of two mutually engaging oval gears (20'; 20") is composed of the sum of the large semi-axis (a) and the small semi-axis (b) of the two oval gears (20'; 20").

Claims 7-13 (canceled)